

Designs of Learning and the Formation and Transformation of Knowledge in an Era of Globalization

Staffan Selander

Published online: 15 November 2007
© Springer Science+Business Media B.V. 2007

Abstract In this article, the formation and transformation of knowledge and the role of designs for learning will be elaborated and discussed in relation to the introduction of national curricula and school textbooks during the beginning of the industrialized era vs. the introduction of individual curricula and new digital learning resources in the post-industrialized era of globalization and multiculturalism. Quite different teaching and learning strategies have been emphasized, which I will call here “designed information and teaching” vs. “designs for learning”. It seems obvious that our current society is in a stage of change that requires a new understanding of knowledge, learning and identity formation. The new position and role of the learner underlines the productive and constructive aspect of learning. Pupils not only read texts, they also produce texts, pictures, film and music and they compile and edit virtual texts. Multimodal texts, as well as the information flow of the Internet, are the consequences of, and at the same time a vehicle for, new social patterns. “Learning Design Sequences” (LDS) is introduced as a theoretical map for the purpose of analyzing critical incidents in (a creative) learning process, using different genres, modes and media in a process of meaning-making.

Keywords Designs for learning · Meaning making · Global learning · Formation and transformation of knowledge · Text and media genres · Interpretative space · Contextual framing

Introduction

About 25 years ago, Yoneji Masuda published a book on the post-industrial information society, in which he described the attempt to create a “Computopia” in the year 2000 (Masuda 1982) (and the Japanese government actually spent billions of dollars in 1970s and 1980s on this kind of vision). In Computopia, information would be delivered by a

S. Selander (✉)
Department of “Didaktik och pedagogiskt arbete”, Stockholm University, S-10691 Stockholm,
Sweden
e-mail: staffan.selander@did.su.se

central information department, time values would be of greater importance than material values, and a systematic development of society would take place without wars. Masuda assumed this development to be natural and inevitable, although he contrasted his Comptopia with the far more fearful “Robotstate”. In his final words, he emphasized the total, virtual world as a symbiosis between man and God, where humankind could attain common, global goals. It is interesting to notice that another vision—albeit a dystopian one—was published as early as the 1940s in the novels *Animal Farm* and *1984* by George Orwell (1945, 1949). He highlighted the consequences of new technologies, total power, suppression, ongoing war and the creation of a new, reified language as a control mechanism of “reality”. Technological changes of information structures and information flows in a society seem to be conceptualized as either a Utopia or a Dystopia.

In this article, the formation and transformation of knowledge and the role of designs for learning during two historical phases will be contrasted: the introduction of national curricula and school textbooks during the beginning of the industrialized era, which to some extent still flourish, and the introduction of individual curricula and new digital learning resources in the post-industrialized era of globalization and multiculturalism. During these two epochs, quite different teaching and learning strategies have been emphasized, which I will call here “designed information and teaching” vs. “designs for learning”. The role of education in relation to the forming of identities has undergone profound changes. It seems obvious that our current society is in a stage of change that requires a new understanding of knowledge, learning and identity formation, as well as a new way of understanding ethical dilemmas.

To Become as a Child for the Future

Obligatory, systematic schooling for the lower ages—with reading and writing, religion and nationalistic subjects such as history and geography—was an important thought figure, from the beginning of the industrialized societies during the nineteenth century, for shaping a “child”, a “people” and a “Nation”. Much of what characterized this schooling has prevailed during the twentieth century. One of the main functions (and ideas) of this system was *exclusion*—to exclude as many as possible (meaning lower-class people, women, minority groups, disabled youngsters of various kinds etc.), so that only a small elite of white, middle-class males could enter the higher educational system.

The current post-industrialized educational system, at least in the Western world, seems to be facing its biggest challenge since it was established. Students stay in school for a much longer time (up to 13 years) and many continue their studies at universities and university colleges. Migration, globalization, travel, new information flow (international TV programs, cellphones with sms and mms, digital resources with Internet, Web 2.0 etc.) open up for far more information, text production and perspectives than ever before. As early as the 1970s the relation between a specialized education and a specific job was broken. Since then, to be educated is not necessarily a question of being prepared only for a certain kind of job. Rather, the school system gives a general education for many different kinds of possible activities.

The longer students stay in school, the more demands are put on the school system itself. *Inclusion* rather than exclusion is one aspect of this change. Schools cannot function only as a sorting mechanism. They are places where children and teenagers mature slowly, without much contact with the labour market. A special youth culture has long been well established which, interestingly enough, does not seem to be integrated into either the

world of schooling or the world of production. Youth culture is to a large degree defined in terms of life styles and consumer patterns. However, there are exceptions, like music culture and the culture of sports, in relation to both production and consumption. For example, skateboard culture has been created both as a niche of oppositional culture and as a strong economic field of its own (corporate branding, clothes style, world competitions, video-films etc.) (Bäckström 2005).

Another aspect of the new youth culture is the testing of many, often short-lived identities, a phenomenon that has been discussed in terms of “tribal societies” (Melucci 1992). This world of testing identities and consumption patterns meets an environment of learning that still resembles much of nineteenth-century schooling, with its specific school subjects, routines and ways of teaching and so on. However, important changes seem to be under way. Conceptually, this can be noticed in the change of emphasis from teaching to learning, from exclusion to inclusion, from a common curriculum to individual curricula and from structure to flexibility.

Globalization takes place in terms of global economic structures that change regional and local conditions, and in terms of an intense information flow, even if globalization as such is not a totally new phenomenon. Since the fifteenth century, the countries outside Europe have become more and more integrated with Europe—not least as colonies. In the twentieth century, North America became the central power of world integration, in terms of military and economic power and in terms of symbolic values (individualism, Coca Cola, Hollywood etc.). And only a few decades ago, the interdependence between the first, the second and the third worlds was intensely discussed. Today, Asia is seen as the new superpower, and the digitalization of information links many parts of the world together, a mutual although unequal, interdependence. But it is also the case that many parts of the world are still not fully integrated in the global (net) world, like large parts of Latin-America, Africa and Asia, although they are affected by changes in information flow and the globalization of production and commerce. The “global learning” issue raises questions about how “global” this change is, and if it is moving towards a utopia or a dystopia or towards something quite different. It seems to be of importance to conceptualize this change in a way that deepens our understanding, and at the same time gives us tools for acting with global responsibility concerning, for example, migration and information flow in relation to school structures, educational content, learning resources and pedagogy. In discussing this, I would like to start with two examples of schooling, the first observed only a few years ago in West Africa and the second, about learning activities in a digital classroom, observed quite recently in a Swedish school. The first example, Guinea-Bissau, is interesting both because it shows a strong and long-lived tradition of schooling and because it also mirrors the school structure that emerged in the second part of the nineteenth century and which in many respects has prevailed ever since.

The Outdoor School in Bissau

About 50 pupils are sitting at rickety desks in a “classroom”, delimited by a rope around some trees and a small shelter. The young and newly-recruited teacher stands in front of the pupils. She is leading the activities by shouting phrases aloud, phrases that all the pupils repeat in chorus after her. In her hands she holds a school textbook. Only a few pupils have their own textbook.

After a while, she looks in her book and asks a question. Not everyone understands this question. Some pupils raise their hands to gain her attention, others shout different answers

and still others start to play around or quarrel with each other. The teacher looks a bit disturbed, and to catch the pupils' attention she continues with a new question, which once again results in the same reactions from the pupils. Eventually, the teacher continues to read aloud and the pupils continue to answer in chorus.

This is, among other things, an example of designed information units (the textbook) and designed teaching sequences (following the textbook). We can read this situation because we already know something about the institutional ramification of schooling in terms of typical roles, activities and division of labour. The activities are rather strongly framed: in terms of a specific place, the "classroom", in terms of time, a lesson and in terms of an artefact, the school textbook. It is also mentally framed according to certain cultural patterns as well as socio-political patterns of power relations and subordinations that affect group climate and epistemological commitments of what counts as knowledge.

The Digital Learning Space

The next example is from a computerized school. The activity in one of the classes is labelled as "Travels in Europe" and includes video-filmed interviews, preparations of Power Point presentations and the like. The time frame is not the lesson and the students are expected to work in groups for several hours. The whole sequence has a duration of a couple of weeks (although also intertwined with other activities and school subjects).

Here, a fundamental rearrangement compared to the first example has taken place in terms of institutional ramification and communication. Even if it is possible to see more "free" work in schools, for example inspired by Montessori and Freinet, digital learning space allows for other possibilities than the physical learning space. Actually, both time and space will become more open for different kinds of activities with regard to both the modes and media of production and the representation of knowledge. It also seems to be the case that the mode of image is taking over the role hitherto held by the mode of writing, and the medium of the screen is taking over the place that has hitherto been occupied by the book. This rearrangement in the constellation of modes of representation and media of dissemination—from *writing and book* to *image and screen*—is having profound consequences for institutional arrangements for meaning-making and hence for learning (Kress 2003).

Current theories of learning are founded on theories of meaning developed in an era constituted entirely differently, around the assumptions of stable systems and the replicability of forms, processes and actions. It is authoritarian, and neither creativity nor innovations are features of that system. Creativity has, as in the Romantic tradition, been a specific space for the genius, the law-breaker, the dynamic changer of established structures, a man (!) of wisdom and knowledge, almost touched by the hand of God and thus constantly born anew in his (!) creative work (Berlin 2000). Artist and poets have been examples of "accepted" breakers of tradition, not the ordinary man. But it is not this kind of romantic enterprise that is at stake when we talk here about creative pedagogy and didactics in a new digital environment and in a world of multicultural perspectives and values. It is rather the move towards an open learning space where creative differences in the formation and transformation of knowledge and identity are allowed to be expressed.

The Digital Revolution and the Role of the User

Wikipedia is an example of what today is called Web 2.0 (O'Reilly 2005). Wikipedia is also called the "free" encyclopaedia and its content is constantly constructed and

reconstructed by the users. Anyone with access to the Internet can create or redefine a word in this encyclopaedia. Added to each article is also a forum for discussion with possibilities to make critical remarks. Another example of this development is that the Swedish publisher Natur&Kultur has started to use a web-based “author’s tool” to complement their language textbooks. This is the learning of the new generation, they say, in which the responses from the users are of much greater relevance than earlier (Press release, Cleaverlearning 2006-09-19). The new web tools (*iMovie*, *iPhoto*, *flickr.com* and *youtube.com* for photos, films and video clips, *Garageband* for creating music, *PowerPoint* and *Mind Manager* for presentations, learning platforms like *Guide&Tips* and *FirstClass*, and *RSS-agents* who can give a hint when new information emerges in one’s field of interest etc.) make students editors and producers of content, not merely readers of predefined information. The term Information Technology (IT) has consequently been extended to Information and Communication Technology (ICT) (Selander et al. 2007).

Communication and interaction are also relevant in distance learning (or “learning communities”, “cyber education” etc.). One can notice a change of interest from hardware to software and from technology to pedagogy and didactics. Instead of seeing communication as a series of steps in the transportation of a message from a sender to a receiver through a medium that in various ways disturbs the message (adds “noise”), communication is seen as the creation and exchange in meaning-making processes (the Latin word “comunicare” means “to make something in common”). The reader, or the user, of a sign is not a passive receiver of messages but an active interpreter and producer of texts (in a wide sense) against the background of experience, attitudes, interest and feelings (Fiske 1990, p. 62).

Resources for Design—New Demands on Curricula

Why is it, as James Paul Gee has phrased it, difficult for some children to learn how to read? (Gee 2004) To read is (at a basic level) to be able to combine 44 phonemes with 26 letters (in the English alphabet). The same child who has learning difficulties related to reading in the school context can easily learn the Pokémon system, which entails 150 characters, 16 types coupled with 2 evolution possibilities and 8 individual skills. So—why is learning to read difficult whilst learning the Pokémon system is not?

When communication is seen as meaning-making, the concept of design is close to it. Design is a way to configure both communicative resources and social interaction (Kress and van Leeuwen 2001). Central tools for communication are the modes (letters, sounds, gestures, moving images etc.) and the media (newspaper, book, TV, computer, radio etc.). In a user-oriented design process, emphasis is laid on transparency, user control and playability, social-action space and personal connectedness (Lövgren and Stolterman 2004). These aspects of communication open up a new understanding of learning.

The massive amount of content in the digital space seems to make traditional curriculum content obsolete. However, long and strong traditions still dominate much school work. When students use films to represent “their” world, this is more or less only a “free” activity beside their ordinary school work (Lindstrand 2006). And in the development of community-based music education in Sweden, the pattern of ordinary schooling has dominated the teaching activities during “free” music activities (Rostvall and West 2001).

The concepts of ‘education’ and ‘learning’ are strongly linked to their institutionalized practices: as formalized education in preschools, schools, universities or workplaces, or as semi-formal learning spaces in museums and theatres. Here, institutions are understood as

“legitimized social groupings” (Douglas 1986, p. 46. Also see Douglas 1996), grounded in shared classifications, practices, rituals and sanctions. Formal education, school subjects, tests and marks are nowadays regulated by shared global and technological classificatory systems.¹ Here, we can also notice a gap between the individual creative space and the (more or less globally) controlled social space. Is it at all possible to combine the idea of institution with dynamic change, with “operative fictionality”? Post-modern institutions change the symbolic organization, combine registers and repertoires in new ways, and the technological and social dimensions are placed in “multiple cultural orders”.²

Designs for Learning

Design in this context deals with changed dispositions towards information and knowledge. What emerges from this is the notion of design as an educational aim, and as a consequence of social, economic, political, semiotic and technological changes. “Design” is a necessity both for teachers in terms of designing environments and processes of learning, and for the individual student to design his or her own learning path. The designer asks how he or she can use material resources and the structures of power in a specific environment. This is one of the consequences of decentralized societal structures, but it also a development that increases the tension between the local planning of school work and the centralized assessment of school outcomes.

The concept of “designs of learning” is one way of emphasizing the activities of forming and transforming knowledge, looking closely at both the modes and the media and the activities and processes of interpretation and design in meaning-making and learning. The designs of learning perspective give another approach to communication and learning than has been prevalent in the constructionist notion of, for example, concept building (the Piaget tradition) and in the constructivist notions of the (rather general) role of the artefact for the collective memory and social interplay (the Vygotsky tradition). The new perspective emphasizes the learner’s meaning-making and sign production by way of modes and media.

“Designed Information and Teaching Sequences” vs. “Learning Design Sequences”

“Designed information and teaching sequences” is a concept that captures the world of prefabricated learning resources, formalized work and strict timetables (lessons). The role of the teacher is to “bring” knowledge to the student, and the student’s role is to remember by heart and to learn specific skills. Thus, knowledge about classificatory systems was only some 40–50 years ago one of the central aspects of education: to collect and classify flowers or insects was at the time more important than understanding biological development and function or how to use natural resources in a careful way. To classify grammatical rules was more in focus than the ability to communicate in a foreign language. To correctly prove a geometric law was more important than being able to think of

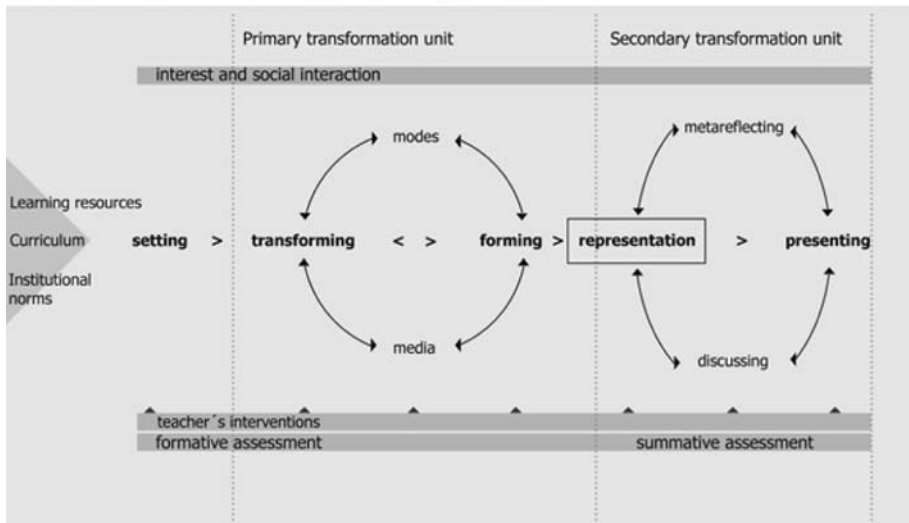
¹ Also see Bowker and Star 2000, and Mäkitalo 2002, concerning the classification of diseases and persons outside the labour market respectively.

² Knorr Cetina (1994) and Gadamer (1988) claims that tradition is always recreated through practices. At the same time he sees tradition as ‘given’. Vattimo (1997) discusses tradition as not given but as something ‘handed over’ (über-lieferung), and thus as something open for negotiation and conceptual re-creation.

different possible mathematical solutions to a problem and so on. However, the number of classificatory systems and the amount of information make it almost impossible today to enforce narrow standards for what knowledge is about. The ability to search, select and critically evaluate information, as well as the ability to present information, is of importance today. Thus, remembering by heart is no longer the only aspect of being educated.

“Learning Design Sequences” (LDS) is a theoretical map for the purpose of analyzing critical incidents in (a creative) learning process, in a process of meaning-making.³ This model enhances: the formal learning process, which begins with the teacher setting a “scene” with the theme to work with, after which the students’ process of transforming and forming of knowledge starts, where different kinds of modes and media are used. Furthermore we have: the group climate, the formal and informal interaction between students and teachers and among students; the teacher’s interventions during the sequence and his or her formative assessment; the representation in the form of an article, an essay, a Power Point or a film, its rhetorical configuration in terms of structure, focus, arguments, examples or metaphors and the like; the final meta-reflection, discussion and feedback, but also the summative assessments of process and product.

Formal - LEARNING DESIGN SEQUENCE



The aim of this model is to analyse the design activity in learning sequences, the formation and transformation of knowledge when students deal with their tasks as problem-solving, information-seeking and sign-producing activities. The framing of a sequence is dependent on curriculum, institutional norms and rules and the artefacts (media, instruments etc.). A sequence starts when the teacher introduces a new task and sets the conditions for the work, which is also the beginning of the “primary transformation unit”: the interpretation of the task and the setting, and the process of transforming and forming knowledge—by way of different modes and media. The “secondary transformation unit” starts with students presenting their work. This is a meta-level, consisting of the mutual meta-reflection over the process and the product and, of course, the teacher’s final

³ To this model is also added more general Learning Design Sequences and Semi-formal Learning Design Sequences (Selander 2008).

assessment of the work. If the goals, as well as the expectations of the process and product, are clearly defined and explained at the beginning, both students and teachers will have a powerful tool for reflection and evaluation. During the whole sequence, teachers make interventions and have the possibility to reflect over the signs and indications of learning that occur during the process.

In traditional teaching (if we may say so), goals are not clearly defined beforehand and signs and indications of learning are not highlighted during the process. The traditional class-room teaching activity, based on school textbooks, take many aspects of the learning process for granted. This is probably why many empirically observed LDS's are not yet fully developed in terms of conscious "designing" processes, that is, the "new" tradition is not yet established as a routine. Examples of these processes, and of the role of new technologies and narratives, are even more fully developed in semi-formal learning environments like museums (Kahr-Höjland 2006).

From Setting to Presenting

The beginning and end of an activity can be discussed in terms of a coherent "narrative". During the setting, the teacher can inform the students about a large range of aspects: the idea of the activity, the expected product, the criteria for judgements and so on. In our study, it seems to be the case that, first and foremost, it is at the upper secondary level that teachers give enough information to the students. If this is not the case, the teacher has already lost the possibility to adequately support and judge the student's work and learning. At the end, the students present their work. The character of this presentation is dependent on the initial aim of the sequence. Sometimes it seems more like a show for friends and parents than a reflected activity, which focuses on the decisions during the process and on how the students have given a form to their understanding of the field of knowledge in question.

Transforming and Forming

Students seek and transform information, they cut and paste information from the Internet, but they also produce new information by way of interviews, making films, producing music or constructing three-dimensional objects, for example. Besides this, the students also test by means of mimesis different ways of working and behaving. This performative side of learning seems to be an underdeveloped field in the current understanding of meaning-making (Cf. Fischer-Lichte and Wulf 2001). Students finally configure their representations in a form that reflects their understanding of the task. The whole process (see below) of sign-making could, for the purpose of understanding how a student has interpreted the task, be of importance for the teacher's work, not only the final representation. The transforming-forming process contains many choices and decisions, which may also be of importance for the meta-reflection and critical evaluation during the second transformation unit.

Representations

The students' representations by way of different modes and media show their choices, what they perceive as central or peripheral. The representation itself indicates what

student's value as natural or divergent, important or unimportant, central or peripheral, necessary or unnecessary and so on. It is also a matter of evidence, argument and rhetorical structure.

Social Interaction

Another aspect concerns both the socio-emotional group climate and the task-oriented interaction among the students. It entails issues like how a group develops (or does not develop) a common responsibility for the work, if someone is left outside or if someone takes over, how students talk to each other while they are searching for information and forming their representations and so on. Central question are: Who is active and who is passive? In what ways are the group supporting or hindering learning? How can the group handle tensions or insecurity?

Teachers' Interventions

During this process, the teachers may function as a support for the group. But is their interaction dominated by technical problems, problems of discipline, content-oriented questions, or do teachers simply interrupt group work by delivering last week's test results from another subject area? Interventions may also be carried out in terms of formative assessments to support the students' learning of a task.

Meta-reflection and Discussions

In the secondary transformation unit the product, the representation, is presented. Central questions are: How is the work carried out in relation to the student's earlier work? But also: How is the work in relation to the work of other students? The activity is oriented towards meta-learning and consciousness-raising activities. To be able to make productive reflections, it is essential to relate these to the signs of learning during the process. The role of the teacher is to give a summative assessment of the work, the presentation and the product.

Indications of Learning

A crucial aspect of the LDS model is how sign-making can be documented as an indication of learning. It not always easy to detect how and when learning occurs since learning is a term for many different and complex activities. Learning can be a change of behaviour and skills but also increased memory and a deeper understanding of new concepts. Learning can be an increased capacity to solve new problems or even old problems in a new way. Learning can be about new patterns of social communication. When activities are carried out without too much effort, we can see learning. When students start to discuss in new terminology, we can see learning. When students can suddenly solve a problem, learning has occurred. When students seek and talk about what they find on the Internet, the social aspect of learning is clear. When they use (digital) portfolios, learning steps can be observed.

Indications of learning in a formal setting is based on the students' sign-making activities, but made visible as a relation between an expected outcome (the institutional norms) and the activities themselves. Signs of learning may occur without anyone really noticing them, if the institutional rules and norms themselves do not especially take notice of these signs. Creative learning is not the same as learning by heart, learning certain movements (as in dance) is not the same as learning how to run a lab lesson and so on.

New technologies and new ways of working didactically raise new obstacles and problems. In the following, I will illustrate some of the critical incidents observed concerning what students might learn in a digital environment.

Examples of Digital-Learning Experiences

The following examples are from case studies of the digital-learning environment in some Swedish schools (Selander et al. 2007). These schools are in many senses in the forefront of using digital media; they have changed their pedagogy towards a more dynamic perspective on learning. But even if many dynamic aspects are emphasized, some obstacles, due to tradition or lack of experience, may also be noticed.

Strong Content Orientation but Weak Use of the Medium

In a distance Swedish-language course (upper secondary level), the students send their tasks to the shared, virtual class room. The idea of the teacher is that the students should make comments on each other's texts, but this does not happen. The communication is highly teacher-oriented and the students do not use the medium to talk to each other. The course has the character of an older (letter-based) distance course. The potential of the medium is not utilised here.

Focus on the Medium but Weak Content Orientation

In a theme project among Grade seven in the compulsory school, the pupils work with the question of "the worst things that can happen". Four main themes are highlighted, and one of the groups chooses to work with "not being good enough". The members of the group work with a digital camera, external memory discs and (both stationary and mobile) PCs, and they use programs like iMovie, iPhoto and Garageband. The students' questions to the teacher are more or less only about the medium and the technology itself. Questions are raised about how to transfer filmed material from the camera to the computer, or how to create neat bridges between different film sequences, for example. The teacher answered these questions but the content was not discussed, for example, "why" the students wanted a certain visual representation and "what" they wanted to tell with this.

Technical Obstacles

When students are working with digital films, making interviews, editing the material and so on, they are involved in creative learning activities. They invest interest, make many decisions about what information to collect and select for presentation and how to present the story. They design both the content and the form of presentation. They have to make a

film, copy it into the computer, edit it, add music and so on. However, in this process many obstacles may occur, and rather often students are left waiting for help for a (too) long time. They may then become passive; this is a risk not least for younger students when the medium itself absorbs all their interest, not the content.

Learning Through Unexpected Associations or Getting Lost in the Web?

Another example is information-seeking on the Internet (Google etc.) When students write a word in the search domain, a great deal of information may appear. Learning in the digital space can be arbitrary and characterized by chance, that is, learning in the periphery. This does not mean that it is meaningless. It is also a way to train for “real” problem-solving situations, with the possibility of opening up the unexpected. However, it is also runs the risk of losing focus. Pupils sometimes change their own questions to fit the (at that moment) accessible information.

Media and Social Patterns of Communication

It seems obvious that new technology, in the long run, changes social communication. When the trade agency Fugger published its first “Zeitung”, this was a totally new way of delivering information. After a time, this became the ordinary way in society to inform people about news and important events, as well as a way of advertising merchandise. Some 100 years later, we find it “natural” to read daily newspapers. With the advent of television, we have also established the normality of looking at the morning or evening news, and with the Internet we get not only news but also plenty of “ordinary people’s” comments on news. We can even ourselves be part of the production of news. Standards for what is seen as “news” and what it means to be “informed” change over time. On the other hand, political, social and economic regulations of news are also prevalent. Not all countries today have a “free” press, a “free” television or “free” access to the Internet. And the Internet itself is not totally open and “free”; some sites are only for a small group of people, others are only accessible if one pays for using it.

Meaning-making in schools is framed by curricula, pedagogic texts and educational media (Valverde et al. 2002; Brandão and Micheletti 1997). The information flow is to some extent both free and restricted. Tensions between the affordances and given representations in different media on the one hand, and institutional framing on the other hand, are very clear in the school context. This also influences the relation between the affordances of the media and the individually interpreted meanings.

Besides this organizational framing, text genres also offer negotiable spaces of meaning (van Leeuwen and Selander 1995; Selander and van Leeuwen 1999). Texts are composed in line with (albeit sometimes also in opposition to) social norms and standards. A text genre is a social agreement, a text norm, for which texts shall have status as text of a certain kind: a cooking recipe, timetable, traffic sign, news, scientific essay and the like. These are all dependent on social regulations and a degree of expected trustworthiness. Genres make it possible for authors (designers of texts, games etc.) and readers (designers of interpretation and application) to communicate without too much effort. Every genre has its “semiotic economy”, its way of organizing all accessible information in “natural” and “usual” ways (Stewart 2001). Let us take two examples: the family album and the news. Each family album shows a unique family, but is also arranged in a “natural” way that

resembles most other family albums from a specific period of time. Also when looking at the news, we (more or less) know what to expect: everything from terrible events in other countries to the (mostly) calm weather reports, assuring us that this particular day is more or less the same as the day before. In the school context, much of what is expected belongs to tradition: the role of the teacher, how to read a school textbook, what counts as knowledge in a particular context and so on.

In our first-mentioned example, teaching and learning in Guinea-Bissau, the correct reproduction of the curriculum was, so to say, programmed into the textbook and into the ‘normal’ behaviour of a teacher. The interpretative space of the text was rather limited. Our second example, the digital classroom, gives much more weight to the selection and interpretation of information and the active construction of (in a wide sense) new texts. The interpretative space is then much larger, compared to our first example. But this does not mean that the “new” school is not framed at all, only that it is framed differently.

The massive amount of information available and the demands of selecting and evaluating it make school work more complex and diversified than ever before. Digital media make it in many ways easier to visualize and explain complex structures (Säljö 2005). The medium carries resources which allow students to engage in meaning-making (Kress et al. 2001). The students’ possibilities to develop their own ideas and get inspired by others may increase (Holm Sörensen et al. 2006), and the medium may inspire them to have fun during their work, even if “having fun” is not linked so much to learning as to play (Alant et al. 2003). Programmes for both play and learning seem to be used only occasionally (Drenoyianni 2006).

However, in many schools, teachers use computers as a kind of traditional textbook or as a means for keeping themselves informed—so as not to lose control over the children’s activities (Selander and Skjelbred 2003). Writing and information-seeking are the most prevalent activities on the Internet, and sometimes “cut and paste” pedagogy dominates, like when information is not worked on but just copied into, for example, a Power Point presentation. There also seems to be a stress factor when students try to get finished before they have actually completed their investigation (Holm Sörensens et al. 2006). Quite another kind of problem is the fact that the ethical consequences of the possibilities to present material for a large public on the Internet are often not noticed at all by teachers (Loveless 2003). It seems that schools, in general, are not yet used to the new information structure: neither its communicative and constructive possibilities, nor its possible misuses and new ethical demands.

The new media are often called interactive. However, in many instances “interactive” seems to embrace more or less everything from “initiative to act” to “response to stimuli” (Otnes 2001), or sometimes just “electronic”, “modern” or “alternative” (Aarseth 1997; see also Linderoth 2004). Interactivity is, in its deeper sense, related to the possibilities for the individual to interact with, not only react upon, the medium. Expanded space for social “inter”action and individual interests—within the institutionally regulated and controlled structure—will certainly be one demand for schoolwork and established power structures to face. We will see displacements, reductions and enlargements of frames, as well as switches of values and rituals before new coherent patterns emerge.

Final Remarks

I started this article with two visions, Utopia and Dystopia. These concepts seem to be formulated from expected or feared futures. However, if we look more closely at what

happens in environments using the new technology, neither Utopia nor Dystopia appear to be adequate. In our case here, the changes from industrialized to post-industrialized education have been discussed in terms of “designed information and teaching” vs. “learning design sequences”. We have noticed some important and irreversible changes: from printed texts to digital images, from rather mono-cultural to multi-cultural contexts, from a general curriculum to individualized curricula and so on. Classroom work has been supplemented with both group and individual work. The role of the teacher has changed from lecturer to instructor and tutor; the role of the pupil from passive receiver to active designer of knowledge. Education and citizenship have been supplemented with life-long learning, individual development and the like. We could also (metaphorically) say that, in the classroom during the time of industrialization, the teacher worked like the priest in the traditional Christian church, telling the congregation how to interpret the Book. We could even notice this pattern in the village school in Guinea-Bissau (probably a consequence of the global colonial impact) in relation to the textbook. In this case, both the tradition and the institution strongly restrict what kinds of actions could actually take place. At the end of the industrialized epoch, the introduction of digital media and the new ways of using texts, both as a vehicle for understanding and as a form for meta-reflection, forms a new arena for school work and formal learning activities. Being able to express one’s own thoughts and reflect on one’s own learning has become a “necessity”, although this change is not yet fully developed in all school work. The new position and role of the learner underlines the productive and constructive aspect of learning. Pupils not only read texts, they also produce texts, pictures, film and music and they compile and edit virtual texts. Multimodal texts, as well as the information flow of the Internet, are the consequences of, and at the same time a vehicle for, new social patterns. There seems to be a resemblance between the Internet and the Talmud, which differs a good deal from the text tradition in Christian churches. In the Talmud, we find no clear starting point, no clear ending, rather an indefinite series of questions and answers, and constantly new possible answers (Rosen 2001).

Another aspect of the changes we have pointed out here is the question of power relations, access to information and possibilities to create new information. Even though the new technology gives opportunities for a much greater information flow than ever before, and even though more people than ever before have access to information, these opportunities are not equally distributed. There is, still, a gap between industrialized and non-industrialized societies, between those who have economic space and those who have not, between those who know how to take part actively in the digital space and those who do not. Even if schools may to some extent compensate for social inequalities, they will themselves also produce new standards for what counts as knowledge, knowing, being informed, being capable of ... and the like. As long as schools also function as a sorting machine, this seems unavoidable. New technology changes what is counted as in or out, what it means to be informed or not, but it is the social distribution of power that sets the institutional standards of sorting and classifying as such. It seems to be in the interchange between social frames (norms, standards, power relations etc.), social dynamics (gaps, controversies, protests etc.) and technological possibilities that we find the complex pattern of change.

As I see it, we are only at the beginning of the transformation towards new institutional and communicative patterns in society at large and in education specifically. It will be necessary not only to incorporate new epistemologies, power relations and value schemata, but also to understand the social distribution of power and of information, the role of

migration, digital media and images for learning—for how knowledge is formed and transformed—in an era of globalization.

References

- Aarseth, E. (1997). *Cybertext. Perspectives on ergodic literature*. Baltimore: The John Hopkins University press.
- Alant, L., Engan, B., Otnes, H., Sandvik, M., & Schwesb, T. (2003). *Samhandling med, foran og via skjermen. Småskoleeleven på vei mot digital kompetanse*. Oslo: Forsknings-og kompetansenettverk for it i utdanning Universitet i Oslo.
- Bäckström, Å. (2005). *Spår—om brädsportskultur, informella lärprocesser och identitet*. Stockholm: HLS Förlag.
- Berlin, I. (2000). *The roots of romanticism*. London: Pimlico.
- Brandão, H., & Micheletti, G. (Eds.) (1997). *Aprender e ensinar com textos didáticos e paradigmáticos*. São Paulo: Cortez Editora.
- Bowker, G. C., & Star, S. L. (2000). *Sorting things out. Classification and its consequences*. Cambridge, Mass.: MIT Press Ltd.
- Cleverlearning's press release 2006-09-19. http://www.cleverlearning.se/Pressrelease_e-learning_i_skolan.pdf
- Douglas, M. (1986). *How institutions think*. New York: Syracuse University Press.
- Douglas, M. (1996). *Thought styles*. London: SAGE Publications.
- Drenoyianni, H. (2006). Reconsidering change and ICT: Perspectives of a human and democratic education. Springer Science + Business Media, LLC.
- Fischer-Lichte, E., & Wulf, C. (Eds.) (2001). Theorien des Performativen. *Paragrana. Internationale Zeitschrift für Historische Anthropologie*. Band 10; Heft 1. Berlin: Akademie Verlag.
- Fiske, J. (1990). *Kommunikationsteorier. En introduktion*. Uppsala: Wahlsröm&Widstrand.
- Gadamer, H-G. (1988). *Truth and method. (Wahrheit und Methode 1960)*. London, Sheed and Wards.
- Gee, J. P. (2004). *What videogames have to teach us about learning and literacy*. Palgrave MacMillan.
- Holm Sörensen, B., Danielsen, O., Nielsen, J. (2006). Children's informal learning in the context of schools of the knowledge society. Springer Science + Business Media, LLC.
- Kahr-Höjland, A. (2006). The personal exhibition as an educational tool in a semi-formal learning setting. In E. Bruillard et al. (Ed.), *Caught in the web or lost in the textbook?* (pp. 87–97). Basse-Normandie, Paris: IARTEM, IUFM.
- Knorr Cetina, K. D. (1994). Primitive classification and postmodernity: Towards a sociological notion of fiction. *Theory, Culture & Society*, 11(3), 1–23.
- Kress, G. R. (2003). *Literacy in the new media age*. London: Routledge.
- Kress, G. R., Jewitt, C., Ogborn, J., & Tsatsarelis, C. (2001). *Multimodal teaching and learning. The rhetorics of the science classroom*. London, New York: Continuum.
- Kress, G. R., & Van Leeuwen, T. (2001). *Multimodal discourse. The modes and media of contemporary communication*. London: Arnold.
- Linderöth, J. (2004). *Datorspelandets mening. Bortom idén om den interaktiva illusionen*. Göteborg: Acta Universitatis Gothoburgensis.
- Lindstrand, F. (2006). *Att göra skillnad. Representation, identitet och lärande i ungdomars arbete och berättande med film*. Stockholm: HLS Förlag.
- Loveless, A. (2003). Creating spaces in the primary curriculum: ICT in creative subjects. *The Curriculum Journal*, 14(Spring), 5–21.
- Lövgren, J., & Stolterman, E. (2004). *Thoughtful interaction design. A design perspective on information technology*. Cambridge, Mass.: The MIT Press.
- Mäkitalo, Å. (2002). *Categorizing work: Knowing, arguing and social dilemmas in vocational guidance*. Dissertation, Univ. of Gothenburg.
- Masuda, Y. (1982). *Information society as post-industrial society*. Somerset, UK: Transaction Publishers.
- Melucci, A. (1992). *Nomader i nuet. Sociala rörelser och individuella behov i dagens samhälle*. Göteborg: Daidalos. (*Nomads of the present. Social movements and individual needs in contemporary society*, 1989).
- O'Reilly, T. (2005). What Is Web 2.0. Design patterns and business models for the next generation of software. <http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html>
- Orwell, G. (2004/1945). *Animal farm*. London: Nick Hern Books.
- Orwell, G. (2005/1949). 1984. UK: Ediciones Notes.

- Otnes, H. (2001). Hvor interactive er de interactive tekstene? In S. Selander & D. Skjelbred (Eds.), Fokus på pedagogiske tekster. Artikler fra prosjektet Valg, vurdering og kvalitetsutvikling av lærebøker og andre læremidler. *Notat* No 5. Skrifter fra Høgskolen i Vestfold, Tønsberg.
- Rosen, J. (2001). *The talmud & the internet*. London: Continuum Books.
- Rostvall, A.-L., & West, T. (2001). *Interaktion och kunskapsutveckling. En studie av frivillig musikundervisning*. Dissertation, LHS, HLS Förlag.
- Säljö, R. (2005). *Lärande och kulturella redskap: om läroprocesser och det kollektiva minnet*. Stockholm: Norstedts akademiska förlag.
- Selander, S. (2008). Tecken för lärande – tecken på lärande. Ett designteoretiskt perspektiv. In A.-L. Rostvall & S. Selander (Eds.), *Design för lärande*. Stockholm: Norstedts Akademiska Förlag.
- Selander, S., Åkerfeldt, A., & Engström, S. (2007). Resurser för lärande i en digital miljö—om “Learning Design Sequences” I. In S. Knudsen, D. Skjelbred & B. Aamotsbakken (Eds.), *Tekst i vekst*. Oslo: Novus Forlag.
- Selander, S. & van Leeuwen, T. (1999). Vad gör en text? I. In C.-A. Säfström & L. Östman (Eds.), *Textanalys*. Lund: Studentlitteratur.
- Selander, S., & Skjelbred, D. (2003). *Pedagogiske tekster for kommunikasjon og læring*. Oslo: Universitetsforlaget.
- Stewart, S. (2001) *On longing. Narratives of the miniature, the gigantic, the souvenir, the collection*. Durham: Duke University Press.
- Valverde, G. A. et al. (2002). *According to the book. Using TIMMS to investigate the translation of policy into practice through the world of textbooks*. Dordrecht: Kluwer Academic Publishers.
- van Leeuwen, T., & Selander, S. (1995). Picturing ‘our’ heritage in the pedagogic text: layout, and illustrations in an Australian and a Swedish history textbook. *Journal of Curriculum Studies*, 27(5), 501–522.
- Vattimo, G. (1997). *Utöver tolkningen. Hermeneutikens betydelse*. Göteborg: Daidalos. (These texts are translated from various sources like *Oltre l'interpretazione* och *Etica dell'interpretazione*; 1988–1994).